

What is claimed is:

1. A semiconductor device comprising:
 - a semiconductor substrate of a first conductivity;
 - a first electrode formation region and a second
- 5 electrode formation region formed adjacent to an inner surface of the semiconductor substrate,
 - wherein the first electrode formation regions and the second electrode formation regions are isolated from each other via an element isolation region,
- 10 an upper first-type impurity layer and a lower first-type impurity layer are formed in one of the first electrode formation region and the second electrode formation region,
 - the lower first-type impurity layer has a different first-type impurity concentration from the upper first-type
- 15 impurity layer and is formed under the upper first-type impurity layer,
- 20 a second-type impurity layer and a first-type impurity layer are formed in the other electrode formation region and the first-type impurity layer is formed under a part of the second-type impurity layer having second-type impurities.
2. A semiconductor device according to Claim 1, wherein the upper first-type impurity layer formed in one of the electrode formation regions is set higher than the lower first-type impurity layer formed thereunder in first-type
- 25 impurity concentration.

3. A semiconductor device comprising:
 - a semiconductor substrate of a P-type conductivity;
 - an anode electrode formation region and a cathode electrode formation region which are formed adjacent to an inner surface of the semiconductor substrate,
 - wherein the anode electrode formation region and a cathode electrode formation region are isolated from each other via an element isolation region,
 - in the anode electrode formation region a first P-type diffusion layer and a second P-type diffusion layer are formed inside the substrate in order of increasing proximity to the inner surface of the substrate,
 - the first P-type diffusion layer is higher than the second P-type diffusion layer in P-type impurity concentration;
 - in the cathode electrode formation region a first N-type diffusion layer and a third P-type diffusion layer are formed inside the substrate in order of increasing proximity to the inner surface of the substrate, and
 - the third P-type diffusion layer is formed locally in a region exclusive of the vicinity of the element isolation region inside the cathode electrode formation region.
 4. A semiconductor device according to Claim 3, wherein the first P-type diffusion layer is formed in a region from the surface of the substrate to 0.4μ m in depth, and the second P-type diffusion layer is formed in a region at a depth of 0.4μ

m to a depth of $1.0 \mu m$ below the surface of the substrate.

5. A semiconductor device according to Claim 3, wherein
an anode electrode and a cathode electrode are formed in the
anode electrode formation region and the cathode electrode
formation region, respectively, on the semiconductor substrate
and a diode formed of the anode electrode and the cathode
electrode is used as a protection circuit for input/output
terminals.

6. A method for manufacturing a semiconductor device
10 comprising:

an element isolation step for forming element isolation
regions at predetermined intervals so as to form an anode
electrode formation region and a cathode electrode formation
region apart from each other on a surface of a semiconductor
15 substrate of a P-type conductivity;

a first implantation step for implanting N-type
impurities into the cathode electrode formation region;

a second implantation step for implanting P-type
impurities into the anode electrode formation region;

20 a third implantation step for implanting the P-type
impurities throughout the anode electrode formation region
and into a part of the cathode electrode formation region;

a thermal diffusion step for diffusing the implanted
P-type and N-type impurities by an annealing treatment, and

25 an electrode formation step for forming an anode

electrode and a cathode electrode by accumulating metal material on the semiconductor substrate in the anode electrode formation region and the cathode electrode formation region by means of sputtering.

5 7. A method for forming a semiconductor device according to Claim 6, wherein an upper P-type impurity layer and a lower P-type impurity layer are formed inside the substrate in the anode electrode formation region after the third implantation step, and the upper P-type impurity layer is
10 set higher than the lower P-type impurity layer formed thereunder in P-type impurity concentration.

8. A method of forming a semiconductor device according to Claim 6, wherein the P-type impurities to be implanted into the cathode electrode formation region in the third
15 implantation step is implanted in a region in the cathode electrode formation region which is $0.5 \mu m$ or more apart from a portion in contact with the element isolation region.